TRANSMITTAL OF APPEAL BRIEF			Docket No. M4065.0858/P858
In re Application of: Michael Kaplinsky			
Application No. 09/209,982-Conf. #6236	Filing Date December 9, 1998	Examiner J. M. Villecco	Group Art Unit 2622
Invention: COLOR CORRECTION OF MULTIPLE COLORS USING A CALIBRATED TECHNIQUE			

TO THE COMMISSIONER OF PATENTS:

Transmitted herewith is the Appeal Brief in this application, with respect to the Notice of Appeal filed: October 19, 2006.

The fee for filing this Appeal Brief is $ 500.00.

[x] Large Entity [ ] Small Entity

[ ] A petition for extension of time is also enclosed.

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Dated: December 18, 2006

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Docket No.: M4065.0858/P858
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Michael Kaplinsky

Application No.: 09/209,982

Confirmation No.: 6236

Filed: December 9, 1998

Art Unit: 2622

For: COLOR CORRECTION OF MULTIPLE COLORS USING A CALIBRATED TECHNIQUE

Examiner: J.M. Villecco

APPEAL BRIEF

MS Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

As required under § 41.37(a), this brief is filed within two months of the Notice of Appeal filed in this case on October 19, 2006, and is in furtherance of said Notice of Appeal.

The fees required under § 41.20(b)(2), and any required petition for extension of time for filing this brief and fees therefor, are dealt with in the accompanying TRANSMITTAL OF APPEAL BRIEF.

This brief contains items under the following headings as required by 37 C.F.R. § 41.37 and M.P.E.P. § 1206:

I. Real Party In Interest
II Related Appeals and Interferences
III. Status of Claims
IV. Status of Amendments
V. Summary of Claimed Subject Matter
VI. Grounds of Rejection to be Reviewed on Appeal
VII. Argument
VIII. Conclusion

I. REAL PARTY IN INTEREST

The real party in interest for this appeal is:

MICRON TECHNOLOGY, INC., a corporation organized under and pursuant to the laws of the United States, and the assignee of this application.

II. RELATED APPEALS, INTERFERENCES, AND JUDICIAL PROCEEDINGS

There are no other appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

A. Total Number of Claims in Application

There are 19 claims pending in application.

B. Current Status of Claims

1. Claims canceled: 2, 10, 14, 15 and 18-20
2. Claims withdrawn from consideration but not canceled: None
3. Claims pending: 1, 3-9, 11-13, 16, 17, 21-26
4. Claims allowed: None
5. Claims rejected: 1, 3-9, 11-13, 16, 17 and 21-26

C. Claims On Appeal

The claims on appeal are claims 1, 3-9, 11-13, 16, 17 and 21-26.

IV. STATUS OF AMENDMENTS

Appellant filed a response to the Final Rejection on September 19, 2006, which did not contain any proposed claim amendments. There have been no claim amendments since the final rejection was mailed and all previous amendments have been entered.

The claims enclosed herein in Appendix A incorporate the amendments indicated in the paper filed by Appellant on April 14, 2006.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The claimed invention relates generally to an image correction method and system for correcting a plurality of colors. Abstract. Color correction of an image shown on an image rendering device is desired because the spectral sensitivity of the human eye viewing these images is different than the spectral sensitivities of color imagers. Specification at page 2, lines 4-6. This can cause the colors of an image to appear distorted when viewed by the human eye. Typical color correction methods account for only the primary colors (e.g., red, green and blue) of an image. Specification at page 3, lines 15-16. The invention, on the other hand, is able to correct for a plurality of desired colors, such as for example, the twenty four colors of a test color calibration chart 200. Specification at page 4, lines 1-2. The methods and apparatus of the invention are used to determine a color correction matrix 206 which is, in turn, used to correct the colors displayed on the image rendering device (e.g., a printer, display or monitor).

An image correction system of the invention is shown in FIG 2, reproduced below for convenience.

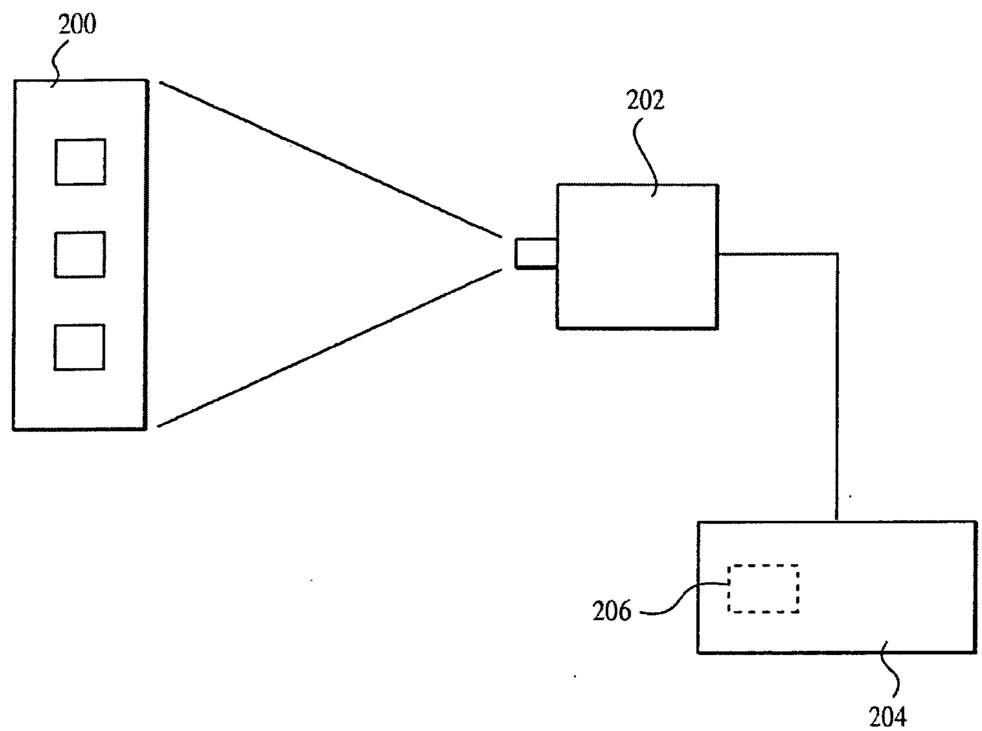


FIG. 2

A color calibration chart 200 contains a plurality of desired colors, such as white, the three primary colors and two other non-primary colors. Specification at page 7, lines 9-10. An example of a color calibration chart 200 containing 24 colors is shown in FIG. 3, reproduced below for convenience (not shown in color herein). A video camera 202, or more generally an imager 202, obtains an image of the color calibration chart 200. Specification at page 7, lines 13-15. To generate an optimal color correction matrix 206, the color calibration chart is imaged under illumination conditions similar to those that will be used during normal operation of the

imager 202. Specification at page 8, lines 14-16. The image is then processed in image processor 204. Detected signal values are recorded for each of the colors on the color calibration chart 200, one for each color channel of the imager 202. Specification at page 8, lines 17-19. For example, for an RGB imager, red, blue and green detected signal values are recorded for each of the 24 colors in color calibration chart 200.

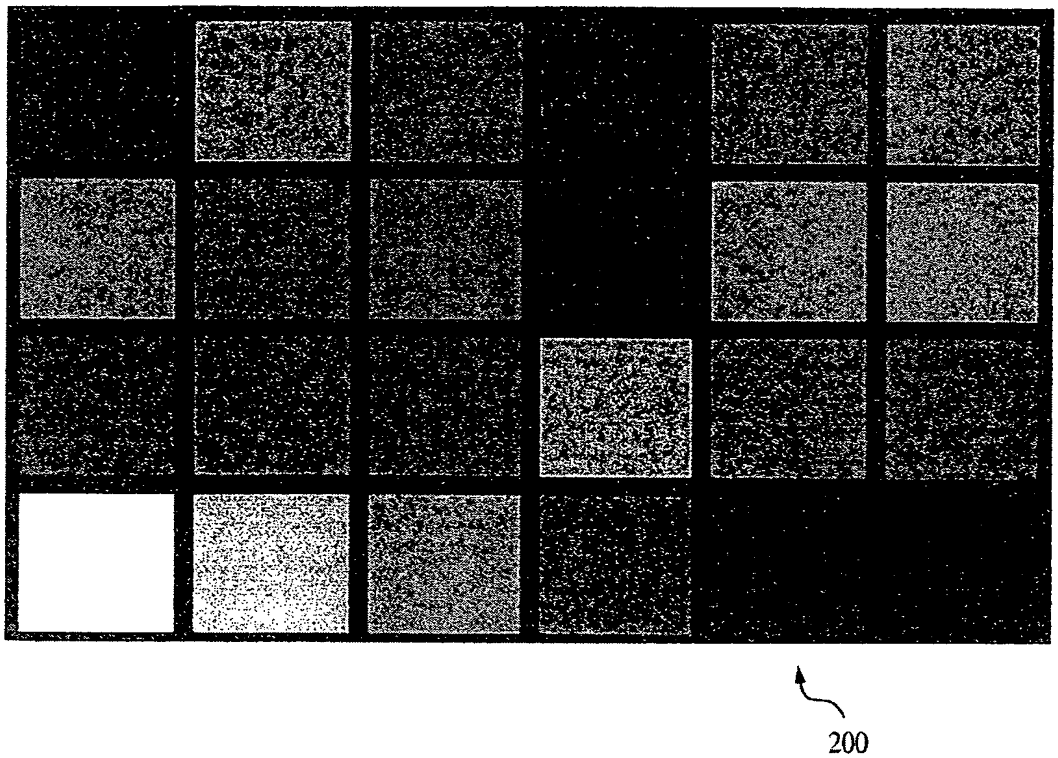


FIG. 3

The color correction method occurs in image processor 204. During image processing, image processor 204 compares each detected color value from the imager 202 with a reference color value determined from an independent experiment, the independent experiment being outside of the scope of the application. Specification at page 7, lines 19-20; page 8, lines 4-7. For each of the colors on the color calibration chart 200, an error signal is then obtained for each of the primary colors, e.g. red, green and blue for an RGB imager. Specification at page 8, line 20 – page 9, line 2. Each error signal is determined as the square of the difference between

the expected color value (the reference color) and the detected color value. Id. Mathematically, this is represented, for each color on the color calibration chart 200, as follows:

$$(Gn' - G_c)^2 = G_E$$

$$(Rn' - R_c)^2 = R_E$$

$$(Bn' - B_c)^2 = B_E$$

where Gn', Rn' and Bn' are the expected color values and G_c, R_c and B_c are the detected color values. Specification at page 9, lines 3-7.

In order to obtain the highest quality overall image, more importance is attached to some colors at the expense of others. Specification at page 10, lines 5-15. This is because subjective image quality is more greatly affected by distortion of some colors than by the distortion of other "less important" colors. Id. Prioritizing colors is achieved using a weighting coefficient applied to the individual color error measures to determine a weighted error measure. Specification at page 10, lines 15-17.

The weighted error measures are represented mathematically as follows:

$$(Gn' - G_c)^2 \cdot W_i = G_E$$

$$(Rn' - R_c)^2 \cdot W_i = R_E$$

$$(Bn' - B_c)^2 \cdot W_i = B_E$$

where Gn', Rn' and Bn' are the expected color values, G_c, R_c and B_c are the detected color values, and W_i is the weight factor for each of colors i, where i varies from 1-j colors and where j is equal to the number of colors represented on the color calibration chart 200. Specification at page 11, lines 4-10.

During the weighting process, each color is weighted according to its importance in seeing an image the way the eye expects to see the image. Specification at page 11, lines 10-11. Red, green and blue (the primary colors) are extremely important, white, skin color and gray scale are important and the rest of the colors are of medium importance. Specification at page

11, lines 11-15. The weighted error signals are simultaneously reduced to obtain color correction matrix 206. Specification at page 9, lines 8-10. This can be done manually or by using a set of linear equations to dynamically change all of the values until the best mix is reached. Specification at page 9, lines 12-14; page 10, lines 18-22. Since all the colors are reduced simultaneously, the best possible solution for subjective color correction is determined. Specification at page 12, lines 1-3.

Another advantage of the invention is that optimal white balance is "built-in" with the color correction matrix 206 and does not require further adjustments as long as the spectra of illumination does not change from that of the calibration. Specification at page 13, lines 11-13.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. The rejection of claims 1, 4-9, 11-13, 16, 17 and 21-26 under 35 U.S.C. 103(a) as being unpatentable over Kim (U.S. Patent No. 6,320,668) ("Kim) (attached as Exhibit 1 in Appendix B) in view of Yamaguchi (Japanese Publication No. 02-074367 A) ("Yamaguchi") (translation attached as Exhibit 2 in Appendix B).

B. The rejection of claim 3 under 35 U.S.C. 103(a) as being unpatentable over Kim and Yamaguchi and further in view of Endo (U.S. Patent No. 6,256,062). ("Endo") (attached as Exhibit 3 in Appendix B).

VII. ARGUMENT

A. INDEPENDENT CLAIMS 1, 6 AND 13 ARE PATENTABLE OVER KIM IN VIEW OF YAMAGUCHI.

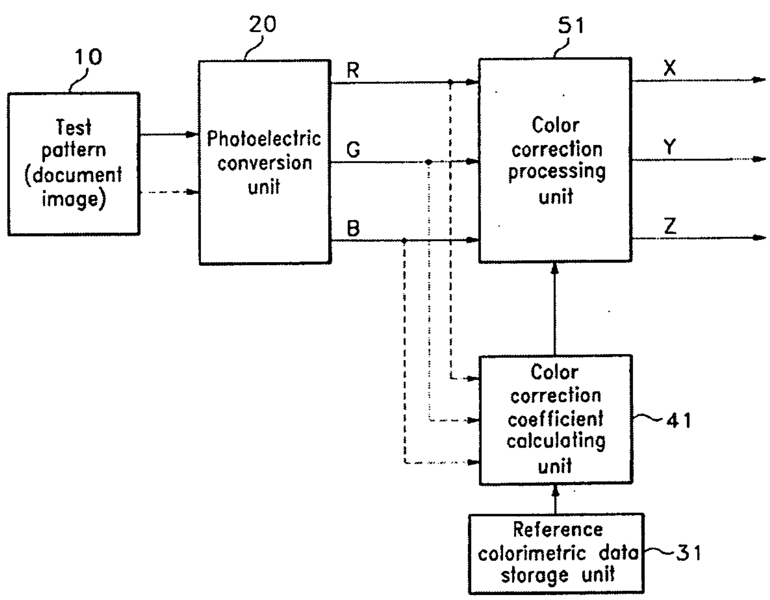
As discussed in more detail below, Appellant respectfully submits that the cited combination of Kim and Yamaguchi does not teach or suggest all limitations of the claimed invention, and furthermore, that a person of ordinary skill in the art would not have been motivated to combine Kim and Yamaguchi. As such, and for at least these reasons, it is

Appellants' position that the subject matter of claims 1, 6 and 13 would not have been obvious (absent the application of improper hindsight knowledge of the claimed invention).

As previously discussed, the invention relates to a color correction method and apparatus for correcting a plurality of colors to be displayed, for example, on a monitor. The method involves determining an error measure for each of red, green and blue for all colors of a color calibration chart 200 by comparing an expected color value to an actual color value determined by an imager 202. A weight factor is then applied to the error measure to account for the subjective importance of certain colors when images are viewed by the human eye. The color correction matrix 206 determined from the method is then applied to the image before it is displayed.

Kim relates to a color correction apparatus and method for correcting the color for an output device, such as a printer. The apparatus of Kim is discussed in relation to FIG. 4, reproduced below, for convenience.

FIG. 4



The apparatus of Kim includes a test pattern 10, a photoelectronic conversion unit 20, a colorimetric data storage unit 31, a color correction coefficient calculating unit 41 for calculating the color correction coefficient matrix, and a color correction processing unit 51. Kim at col. 4, lines 41-64. The color correction coefficient calculating unit 41 reduces an error between colorimetric scanning data and reference colorimetric data to a minimum. Id. The color correction processing unit 51 applies the color correction coefficient matrix to the output of the photoelectric conversion unit 20 and outputs the result. Id. Kim does not take into account the subjective importance of particular colors during image viewing when preparing a color correction matrix.

Yamaguchi relates to a color correction method and device for correcting the colors of color images. In Yamaguchi, a first matrix containing input colors is multiplied by a coefficient matrix to obtain a second matrix which contains corrected color information. This corrected color information matrix is used during image processing. The coefficient matrix is obtained by performing calculations on and weighting certain prescribed colors. Recorded color information for multiple pieces of color sample data are loaded into a CPU. The system of Yamaguchi creates copies of certain ones of the multiple color sample data groups. In other words, the number of color sample data groups is increased from N original data groups (64 in Yamaguchi) to at least N+1 color sample data groups (greater than or equal to 65 in Yamaguchi). The weighted values are determined by the number of copies. The coefficient matrix is obtained by using the weighted set of color sample data groups. The colors of which there are more copies in the weighted set of color sample data groups have a greater effect on the coefficient matrix used for color correction.

1. The combination of Kim and Yamaguchi does not teach or suggest all limitations of the claims.

To establish *prima facie* obviousness of a claimed invention, all of the claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974); MPEP §2143.03. None of the prior art references cited by the Final Rejection, when considered alone or combined, teach or suggest all the limitations of the claimed invention.

a. <u>Claim 1 is patentable over Kim in view of Yamaguchi:</u>

Claim 1 recites an image correction method including, *inter alia,* the steps of "obtaining expected signals," "obtaining detected signals ... for [a] plurality of known reference colors," "determining an error measure for each of said plurality of known reference colors" where the error measure is calculated as the squared difference between expected color value signals and actual detected signals, "applying a weight factor to said error measure for each of said plurality of known reference colors to obtain a respective weighted error measure for each of said plurality of known reference colors," and "obtaining a color correction matrix by simultaneously reducing the weighted error measure for each of said plurality of known reference colors."

i. <u>Kim does not disclose, teach or suggest "applying a weight factor to said error measure for each of said plurality of known reference colors to obtain a respective weighted error measure for each of said plurality of known reference colors."</u>

Kim does not disclose, teach or suggest "applying a weight factor to said error measure for each of said plurality of known reference colors to obtain a respective weighted error measure for each of said plurality of known reference colors," as recited in claim 1. The Office Action dated June 19, 2006 admits that Kim fails to disclose weighting certain colors more than others. Office Action dated June 19, 2006 at page 4. As previously discussed, Kim merely discloses a color correction method that determines a color correction matrix. Kim does not take into account the subjective importance of each of the colors.

ii. <u>Yamaguchi does not disclose, teach or suggest a weighted error measure as recited in claim 1.</u>

Yamaguchi is cited for disclosing that it is known in the art to weight certain colors more than others. Office Action dated June 19, 2006 at page 4. Appellant respectfully disagrees that Yamaguchi discloses or suggests the weighted error measure as recited in claim 1.

Claim 1 recites a simultaneous reduction of weighted error measures. Each error measure is determined as the squared difference between an expected color value and a detected

color value. In claim 1, a subjective weight factor is applied to the error measure to obtain a weighted error measure. The weighted error measure is then used to obtain a color correction matrix composed of simultaneously reduced weighted error measures.

While the Yamaguchi reference uses the term "weighted" several times throughout the reference, the approach is not the same as that which is claimed in the present application. As previously discussed, color sample input data of Yamaguchi is "weighted" by copying certain colors of the group of 64 color sample data groups to obtain a set of color sample data groups that is greater than or equal to 65. However, Yamaguchi does not include a determination of an error measure to which a weight factor is applied. Instead, the color with the most copies in the data set is "weighted" the highest in the color correction process merely because there are more copies of this color used during determination of the coefficient matrix used for color correction.

Appellant respectfully submits that Yamaguchi does not disclose, teach or suggest applying a weight factor to error measures, of any kind, let alone as in claim 1. Yamaguchi merely discloses "groups of recording color information and desired input color digital information of the color sample become copied. ... The weighted values are determined by the number of these copies." Yamaguchi translation at page 9. Colors that are visually sensitive have the highest histogram in the recording image. There are not weight factors that are determined and then applied to error measures for each of the colors before creating the color correction matrix.

Accordingly, for at least these reasons, Kim and Yamaguchi, whether considered alone or in combination, fail to teach or suggest all limitations of claim 1. For this reason alone, the 35 U.S.C. § 103(a) rejection should be overturned.

b. <u>Claim 6 is patentable over Kim in view of Yamaguchi:</u>

Claim 6 recites an image sensor apparatus including, *inter alia*, "an image sensor device" and "an image processor ... to color-correct images ... according to a color correction matrix obtained by simultaneously reducing respective weighted error measures, each of said weighted error measures being calculated by applying a weight factor to a squared difference

between signals seen for a known reference color from said color image array of said image sensor device and signals expected to be seen for said reference color."

i. Kim does not disclose, teach or suggest "weighted error measures ... calculated by applying a weight factor to a squared difference between signals seen for a known reference color from said color image array of said image sensor device and signals expected to be seen for said reference color."

Kim does not disclose, teach or suggest "weighted error measures ... calculated by applying a weight factor to a squared difference between signals seen for a known reference color from said color image array of said image sensor device and signals expected to be seen for said reference color," as recited in claim 6. The Office Action dated June 19, 2006 admits that Kim fails to disclose weighting certain colors more than others. Office Action dated June 19, 2006 at page 4. Kim, in fact, makes no mention of an image sensor apparatus which takes into account the subjective importance of certain colors by any means, let alone by applying a weight factor.

ii. Yamaguchi does not disclose, teach or suggest a weighted error measure as recited in claim 6.

Yamaguchi is cited for disclosing that it is known in the art to weight certain colors more than others. Office Action dated June 19, 2006 at page 4. Appellant respectfully disagrees that Yamaguchi discloses or suggests the weighted error measure as recited in claim 6.

Claim 6 recites simultaneously reducing the weighted error measures for several colors to obtain a color correction matrix. Each weighted error measure is determined by applying a weight factor to a squared difference between the expected signals and the detected signals. The weighted error measure is then used to obtain a color correction matrix composed of simultaneously reduced weighted error measures.

As noted above, while the Yamaguchi reference uses the term "weighted" several times throughout the reference, the approach is not the same as that which is claimed in claim 6.

As previously discussed, Yamaguchi's color sample input data is "weighted" by copying the appropriate colors from the set of 64 color sample data groups to make a set of color sample data groups numbering greater than or equal to 65. There is not a determination of an error measure to which a weight factor is applied. The color with the most copies is "weighted" the highest in the correction process only because there are more copies of this color used during determination of the coefficient matrix used for color correction.

Appellant respectfully submits that Yamaguchi does not disclose, teach or suggest reducing a weighted error measure to obtain a color correction matrix. Yamaguchi merely discloses "groups of recording color information and desired input color digital information of the color sample become copied. ... The weighted values are determined by the number of these copies." Yamaguchi translation at page 9. Colors that are visually sensitive have the highest histogram in the recording image. Id. The data color groups of Yamaguchi are merely copied in order to have a greater effect on the overall data color set.

Accordingly, for at least these reasons, Kim and Yamaguchi, whether considered alone or in combination, fail to teach or suggest all limitations of the claimed invention. For this reason alone, the 35 U.S.C. § 103(a) rejection should be overturned.

c. Claim 13 is patentable over Kim in view of Yamaguchi:

Claim 13 recites a method of correcting an image including, *inter alia*, the steps of "obtaining signals expected to be seen for each of a plurality of known reference colors," and "obtaining a color correction matrix for said pixels ... by simultaneously minimizing error measures relative to each color, wherein respective error measures ... are weighted such that said color correction matrix corrects for some ... colors more than ...[other] colors, each error measure representing a squared difference between signals actually seen for a known reference color ... and said signals expected to be seen for each of said reference outputs."

i. <u>Kim does not disclose, teach or suggest "respective error measures ... are weighted such that said color correction matrix corrects for some ... colors more than ...[other] colors."</u>

Kim does not disclose, teach or suggest "respective error measures ... are weighted such that said color correction matrix corrects for some ... colors more than ...[other] colors," as recited in claim 13. The Office Action dated June 19, 2006 admits that Kim fails to disclose weighting certain colors more than others. Office Action dated June 19, 2006 at page 4. As previously discussed, Kim does not teach taking into account the subjective importance of colors during color correction, by any method.

ii. <u>Yamaguchi does not disclose, teach or suggest a weighted error measure as recited in claim 13.</u>

Yamaguchi is cited for disclosing that it is known in the art to weight certain colors more than others. Office Action dated June 19, 2006 at page 4. Appellant respectfully disagrees that Yamaguchi discloses or suggests the weighted error measure as recited in claims 1, 6 and 13.

Claim 13 recites a color correction matrix obtained by simultaneously reducing error measures. The error measures are a squared difference between signals actually seen and signals expected to be seen. The error measure are weighted such that some colors are corrected more than others. The color correction matrix is obtained from these weighted error measures.

Once again, while the Yamaguchi reference uses the term "weighted" several times throughout the reference, the approach is not the same as that which is claimed in claim 13. In Yamaguchi, color sample input data is "weighted" by copying the appropriate colors from the set of 64 color sample data groups to make a set of color sample data groups numbering greater than or equal to 65. However, there is no determination of an error measure, for each color, which is then weighted. Instead, the color with the most copies is "weighted" the highest in the correction process merely because there are more copies of this color during image processing. Appellant respectfully submits that Yamaguchi does not disclose, teach or suggest applying a

weight factor to error measures. Yamaguchi merely discloses "groups of recording color information and desired input color digital information of the color sample become copied. ... The weighted values are determined by the number of these copies." Yamaguchi translation at page 9.

Accordingly, for at least these reasons, Kim and Yamaguchi, whether considered alone or in combination, fail to teach or suggest all limitations of the claimed invention. For this reason alone, the 35 U.S.C. § 103(a) rejection should be overturned.

2. One skilled in the art would not have been motivated to combine the teachings of Kim and Yamaguchi absent improper hindsight provided by the application.

Appellants respectfully submit that it is improper to combine the references in the manner suggested by the Final Rejection. Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found in the references themselves. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). There is no suggestion or motivation in any of the references of the cited combination for combining them to arrive at the claimed invention. The Office Action is using impermissible hindsight by using the claims of the present invention as a road map to improperly combine the references. See Ex parte Clapp, 227 USPQ 972, 973 (Bd. App. 1985); MPEP §2144. For this reason as well, the rejection should be withdrawn.

As previously discussed, Kim discloses a color correction method and apparatus that perform color correction by minimizing an error between reference data and scanned data from a test pattern. Kim does not disclose, teach or suggest using any sort of weighting during color correction. In fact, Kim does not discuss the relative importance of certain colors over others and their effect on subjective image quality at all.

Yamaguchi discloses color correction using a weighted set of color sample data groups. Yamaguchi, however, does not disclose, teach or suggest using an error measure to perform color correction. Nor does Yamaguchi disclose, teach or suggest a weight factor. Instead, as previously discussed, the "weighting" in Yamaguchi is employed merely by creating

more copies of the color sample data groups of the important colors. There is no suggestion in either Kim or Yamaguchi to apply a weight factor to the error measure of Kim to render the present invention obvious.

Neither Kim nor Yamaguchi provides the motivation necessary to modify Kim as would be required to arrive at the claimed invention. The Examiner merely asserts, without other evidence, that he is "of the opinion that one of ordinary skill in the art would have found it obvious based on the teaching of Yamaguchi to weight the error measures of Kim so that certain colors are weighted more than others." Advisory Action dated October 10, 2006 at page 2. A statement that modifications of the prior art to meet the claimed invention would have been "well within the ordinary skill of the art at the time the claimed invention was made" because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references. Ex parte Levengood, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993); MPEP § 2143.01 IV; See also Al-Site Corp. v. VSI Int'l Inc., 174 F.3d 1308, 50 USPQ2d 1161 (Fed. Cir. 1999) (The level of skill in the art cannot be relied upon to provide the suggestion to combine references.). The Examiner does not provide such an objective reason in this case.

As such, the teachings of Kim and Yamaguchi are not properly combinable and the 35 U.S.C. § 103(a) rejection should be overturned.

3. Claims 1, 6 and 13 are not obvious in view of Kim and Yamaguchi.

In light of the above arguments, Appellant respectfully submits that the independent claims 1, 6 and 13 are not obvious in view of Kim and Yamaguchi and the 35 U.S.C. § 103(a) rejection should be overturned.

B. CLAIMS 4-5, 16, 21, 23 AND 25 ARE PATENTABLE OVER KIM IN VIEW OF YAMAGUCHI.

1. Claims 4-5, 16, 21, 23 and 25 depend from claim 1 and are allowable along with claim 1.

Dependent claims 4-5, 16, 21, 23 and 25 contain all of the limitations of independent claim 1 and are allowable along with claim 1, for at least all of the reasons discussed above.

2. Claims 16 and 21 are further not obvious over Kim in view of Yamaguchi.

a. Claim 16:

Claim 16 further recites "wherein higher weight factors are applied to colors including at least one of red, green, blue, human skin elements and gray scale elements than are applied to other colors." The combination of Kim and Yamaguchi does not disclose teach or suggest applying weight factors to any colors and thus, cannot disclose applying a higher weight factor to red, blue, green, human skin or gray scale elements than to others. In addition, Yamaguchi merely discloses making more copies of flesh tones than of other colors, and does not mention doing the same for red, green, blue and gray scale elements.

b. Claim 21:

Claim 21 further recites "wherein said weight factor is assigned to a respective color based on an impact on subjective image quality." The combination of Kim and Yamaguchi does not disclose teach or suggest weight factors and therefore cannot disclose assigning them to colors based on an impact on subjective image quality.

In light of the above arguments, Appellant respectfully submits that the independent claims 4-5, 16, 21, 23 and 25 are not obvious in view of Kim and Yamaguchi and the 35 U.S.C. § 103(a) rejection should be overturned.

C. CLAIMS 7-9, 11, 12, 17 AND 22 ARE PATENTABLE OVER KIM IN VIEW OF YAMAGUCHI.

1. Claims 7-9, 11, 12, 17 and 22 depend from claim 6 and are allowable along with claim 6.

Dependent claims 7-9, 11, 12, 17 and 22 contain all of the limitations of independent claim 6 and are allowable along with claim 6, for at least all of the reasons discussed above.

2. Claims 9 and 22 are further not obvious over Kim in view of Yamaguchi.

a. Claim 9:

Claim 9 further recites "wherein said weighted error measures are calculated according to

$$(Gn' - G_c)^2 \cdot W_i = G_E$$

$$(Rn' - R_c)^2 \cdot W_i = R_E$$

$$(Bn' - B_c)^2 \cdot W_i = B_E$$

where Gn', Rn' and Bn' are expected color values, G_c, R_c and B_c are actual color values, and W_i is the weight factor for each of colors i, i varying from 1-j colors, and G_E, R_E, and B_E are reduced for each of the plurality of colors." As discussed in relation to claim 1, the combination of Kim and Yamaguchi does not disclose, teach or suggest applying a weight factor to an error measure determined as a squared difference between expected color values and actual color values. Specifically, the combination does not disclose, teach or suggest multiplying an error measure by a weight factor.

b. Claim 22:

Claim 22 further recites "wherein said weight factors W_i are assigned to a respective color based on an impact on subjective image quality." The combination of Kim and Yamaguchi does not disclose teach or suggest weight factors and therefore cannot disclose assigning them to colors based on an impact on subjective image quality.

In light of the above arguments, Appellant respectfully submits that the independent claims 7-9, 11, 12, 17 and 22 are not obvious in view of Kim and Yamaguchi and the 35 U.S.C. § 103(a) rejection should be overturned.

D. CLAIMS 24 AND 26 ARE PATENTABLE OVER KIM IN VIEW OF YAMAGUCHI.

1. Claims 24 and 26 depend from claim 13 and are allowable along with claim 13.

Dependent claims 24 and 26 contain all of the limitations of independent claim 13 and are allowable along with claim 13, for at least all of the reasons discussed above.

In light of the above arguments, Appellant respectfully submits that the independent claims 24 and 26 are not obvious in view of Kim and Yamaguchi and the 35 U.S.C. § 103(a) rejection should be overturned.

E. CLAIM 3 IS PATENTABLE OVER KIM IN VIEW OF YAMAGUCHI AND FURTHER IN VIEW OF ENDO.

Claim 3 depends from claim 1. Claims 3 further recites that "the weight factor is multiplied by said error measure for each of the plurality of known reference colors to obtain the weighted error measure" and that "the weight factor may have a different value for each of the plurality of known reference colors." As discussed above, Kim and Yamaguchi fail to teach or suggest the limitations of claim 1. The Final Rejection admits at page 10 that these references fail to teach or suggest the limitations of claim 3. Endo is cited as disclosing that the weight factor may have a different value for each of the reference colors. Office Action dated June 19, 2006 at page 10. Endo does not remedy the deficiencies of Kim and Yamaguchi regarding claim 1. Therefore, claim 3 is patentable over Kim in view of Yamaguchi and further in view of Endo.

VIII. CONCLUSION

For each of the foregoing reasons, Appellant respectfully submits that the claimed invention is not anticipated by the cited prior art, and reversal of each of the final grounds of rejection is respectfully solicited.

Dated: December 18, 2006

Respectfully submitted,

By____________________

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APPENDIX A

Claims Involved in the Appeal of Application Serial No. 10/680,158

1. (Previously presented) An image correction method comprising:

obtaining expected signals for an image-rendering device of each of a plurality of known reference colors;

obtaining detected signals by imaging a color image array under conditions similar to those occurring during user operation of an image sensor, said detected signals being obtained for said plurality of known reference colors, said plurality of known reference colors including white, at least three primary colors, and at least two other non-primary colors;

determining an error measure, G_E, R_E, B_E, for each of said plurality of known reference colors, said error measure being calculated by

$$(Gn' - G_c)^2 = G_E$$

$$(Rn' - R_c)^2 = R_E$$

$$(Bn' - B_c)^2 = B_E$$

where Gn', Rn' and Bn' are expected color values, G_c, R_c and B_c are actual detected color values;

applying a weight factor to said error measure for each of said plurality of known reference colors to obtain a respective weighted error measure for each of said plurality of known reference colors; and

obtaining a color correction matrix by simultaneously reducing the weighted error measure for each of said plurality of known reference colors to obtain color correction for said plurality of known reference colors.

2. (Canceled)

3. (Previously presented) A method as in claim 1 wherein the weight factor is multiplied by said error measure for each of the plurality of known reference colors to obtain the weighted error measure, and wherein the weight factor may have a different value for each of the plurality of known reference colors.

4. (Previously presented) A method as in claim 1 wherein there are at least seven reference colors.

5. (Previously presented) A method as in claim 1 wherein there are twenty-four reference colors.

6. (Previously presented) An image sensor apparatus, comprising:

an image sensor device, operating using a color filter array which provides color filtering such that colors transmitted to each pixel of a color image array of said image sensor device are converted to signals for all color components provided by said color filtering; and

an image processor arranged and configured to color-correct images obtained by said image sensor device according to a color correction matrix obtained by simultaneously reducing respective weighted error measures, each of said weighted error measures being calculated by applying a weight factor to a squared difference between signals seen for a known reference color from said color image array of said image sensor device and signals expected to be seen for said reference color, said color correction matrix being obtained according to at least the color white, three primary colors, and at least two additional non-primary colors.

7. (Previously presented) An apparatus as in claim 6 wherein said image processor is configured and arranged to obtain said color correction matrix according to at least three primary colors, the color white, and at least three colors other than said three primary colors and white.

8. (Previously presented) An apparatus as in claim 6 wherein said color correction matrix is obtained according to twenty-four colors.

9. (Previously presented) An apparatus as in claim 6 wherein said weighted error measures are calculated according to

$$(Gn' - G_c)^2 \cdot W_i = G_E$$

$$(Rn' - R_c)^2 \cdot W_i = R_E$$

$$(Bn' - B_c)^2 \cdot W_i = B_E$$

where Gn', Rn' and Bn' are expected color values, G_c, R_c and B_c are actual color values, and W_i is the weight factor for each of colors i, i varying from 1-j colors, and G_E, R_E, and B_E are reduced for each of the plurality of colors.

10. (Canceled)

11. (Previously presented) An apparatus as in claim 9 wherein the weight factors for red, green, and blue are higher than those of other colors.

12. (Previously presented) An apparatus as in claim 6 wherein said color correction matrix is obtained according to all colors of a chromaticity chart.

13. (Previously presented) A method of correcting an image from an image sensor including a color image array having a plurality of pixels, comprising:

obtaining signals expected to be seen for each of a plurality of known reference colors; and

obtaining a color correction matrix for said pixels, said color correction matrix being one which takes into account correction for at least the color white, three primary colors, and two other non-primary colors by simultaneously reducing error measures relative to each color, wherein respective error measures for said non-primary colors are weighted such that said color correction matrix corrects for some of said non-primary colors more than said primary colors, each error measure representing a squared difference between signals actually seen for a known reference color from said color image array and said signals expected to be seen for each of said reference outputs.

14-15. (Canceled)

16. (Previously presented) A method as in claim 1, wherein higher weight factors are applied to colors including at least one of red, green, blue, human skin elements, and gray scale elements than are applied to other colors.

17. (Previously presented) An apparatus as in claim 9, wherein simultaneous equations are used to reduce G_E, R_E, and B_E for each of the plurality of colors.

Claims 18-20. (Canceled)

21. (Previously presented) A method as in claim 1, wherein said weight factor is assigned to a respective color based on an impact on subjective image quality.

22. (Previously presented) An apparatus as in claim 9, wherein said weight factors W_i are assigned to a respective color based on an impact on subjective image quality.

23. (Previously presented) A method as in claim 1 wherein the detected signals are obtained for each of a plurality of color channels of said image sensor.

24. (Previously presented) A method as in claim 13 wherein the detected signals are obtained for each of a plurality of color channels of said color image array.

25. (Previously presented) The image correction method as in claim 1, further comprising applying said color correction matrix to an input image obtained using said image sensor with said color image array to provide color correction for each of said plurality of known reference colors to obtain a color-corrected image from said input image.

26. (Previously presented) The method as in claim 13, further comprising applying said color correction matrix to obtain a subjectively color-corrected and white-balanced image directly from an input image obtained using said color image array.

APPENDIX B

A copy of evidence entered by or relied upon by the examiner that is relevant to this appeal is attached hereto. Exhibits 1-3 were first entered by the examiner in the Office Action mailed March 13, 2003.

Exhibit 1: U.S. Patent No. 6,320,668 to Kim

Exhibit 2: Translation of Japanese Publication No. 02-074367 A to Yamaguchi

Exhibit 3: U.S. Patent No. 6,256,062 to Endo

PTO 03-2088

CY=JP DATE=19900314 KIND=A
PN=02-074367

COLOR CORRECTION METHOD AND COLOR CORRECTION DEVICE
[Iro shuusei houhou oyobi iro shuusei souchi]

Toshiyuki Yamaguchi

UNITED STATES PATENT AND TRADEMARK OFFICE
Washington, D.C. March 2003

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INVENTOR	(72):	YAMAGUCHI, TOSHIYUKI
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FOREIGN TITLE	(54A):	IRO SHUUSEI HOUHOU OYOBI IRO SHUUSEI SOUCHI

SPECIFICATION /409

1. Title of the Invention

Color Correction Method and Color Correction Device

2. Claims

1. A color correction method

which is utilized for a color transfer system that outputs an output color corresponding to an input color by entering the information of said input color,

in which the first matrix resulting from said input color is multiplied by a prescribed coefficient matrix and in which the color information indicated by the second matrix, which is the product of the multiplication, is input to said color transfer system, and

in which said coefficient matrix is calculated based on the data of the input color input to said color transfer system and of the output color output by said color transfer system when said input color is input

characterized by utilizing a coefficient matrix that is obtained by performing calculations by weighting prescribed input colors and output colors.

2. A color correction device

which is utilized for a color transfer system that outputs an output color corresponding to an input color by entering the information of said input color,

which is equipped with an arithmetic means that is for multiplying the first matrix resulting from said input color by a prescribed

*Numbers in the margin indicate pagination of the foreign text.

coefficient matrix and for outputting the second matrix that is the result of the operation, and

which inputs to said color transfer system the color expressed by the second matrix output from said arithmetic means

characterized by having: a storage means that stores the data of the input color input to said color transfer system and of the output color output by said color transfer system when said input color is input; and a coefficient matrix determining means that determines the coefficient matrix, which will be multiplied by said first matrix in said arithmetic means, by weighting and calculating the data stored in said storage means.

3. Detailed Explanation of the Invention

[Field of Industrial Application]

The present invention pertains to color correction methods and color correction devices for correcting the colors of color images.

[Prior Art]

Conventionally, this type of color correction device approximates the relationship between recording colors and input density digital information corresponding to the recording colors by means of polynomial equations in advance, stores each coefficient of said polynomial functions as an element of a matrix, and obtains the color correction /41
information of the recording colors by using said matrix and the elements of the input density digital information of each pixel of the color image to be recorded.

One example of said color correction process is indicated in the equation below:

$$\begin{pmatrix} C' \\ M' \\ Y' \end{pmatrix} = \begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix} \begin{pmatrix} C \\ M \\ Y \end{pmatrix}$$

wherein a_{ij} is an element of the stored matrix,

C, M, and Y are the elements of the input density digital information of each resolution color of one pixel, and

C′, M′, and Y′ are the color correction information of the recording colors corresponding to said input density digital information.

[Problems that the Invention is to Solve]

However, said relationship between a recording color and input density digital information is strongly nonlinear in general due to the unnecessary reflection (absorption) characteristics of the recording color components, due to a scaling-law failure of each recording color component, and due to an arithmetic-law failure of the reproduced recording color, and there is a problem in that it is extremely difficult to approximate said polynomial functions in order to obtain color reproduction properties that are accurate in a wide range.

The present invention was completed in order so solve the above-described problem, and its purpose is to supply a method and device for correcting the colors of a color image whereby excellent color reproduction properties can be obtained by performing color corrections suitable for the color image to be recorded.

[Means for Solving the Problem]

In order to achieve the above purpose, the color correction method of the present invention is a method in which a first matrix resulting from an input color is multiplied by a prescribed coefficient matrix and in which the color information indicated by a second matrix, which is the product of the multiplication, is input to said color transfer system. It is a color correction method in which said coefficient matrix is calculated based on the data of an input color input to said color transfer system and of the output color output by said color transfer system when said input color is input, and it is characterized by utilizing a coefficient matrix that is obtained by performing calculations by weighting prescribed input colors and output colors.

Furthermore, as a device for executing this method, the color correction device of the present invention is a device that is equipped with an arithmetic means, which is for multiplying the first matrix resulting from the input color by a prescribed coefficient matrix and for outputting the second matrix that is the result of the operation, and that inputs to said color transfer system the colors expressed by the second matrix output from said arithmetic means. It is characterized by having the following: a storage means for storing the data of the input color input to said color transfer system and of the output color output by said color transfer system when said input color is input; and a coefficient matrix determining means for determining the coefficient matrix, which will be multiplied by said first matrix in said arithmetic means, by weighting and calculating the data stored in said storage means.

[Operation of the Invention]

According to the present invention having the above structure, a coefficient matrix that corresponds to the inverse function of the transfer function of the color transfer system is prepared by the least-squares method, etc. based on the relationship between the input color and the output of the color transfer system. Note, however, that this coefficient matrix is calculated based on the data of the input colors and output colors that were weighted with respect to the prescribed colors, and the color reproduction properties are increased in terms of the prescribed colors.

[Working Example]

In the following, one working example that is an embodiment of the present invention will be explained by referring to figures.

First, the general structure of the color image recording device will be explained by referring to Figs. 1 and 2. A monochrome printer [1] is comprised of the following: a polygon scanner [2] that irradiates laser light; a photoconductor [3] that draws an electrostatic latent image using the laser light; a developer [4] that develops said photoconductor [3] on which the electrostatic latent image is formed; a cassette [5] that feeds normal paper or an overhead projector sheet (OHP sheet); a fixing device [6] that fixes the transferred toner image; and monochrome discharging trays, [11] and [12], that send paper during a black and white mode.

Moreover, a colorizing device [20] that records an image by using color separation mask original plates prepared based on color image

information is equipped with the following: a device part [10a] that has attached to it in a detachable manner a paper path switching part [10] that switches the incoming path in order to feed the color separation mask original plates, [22R], [22G], and [22B], output from said monochrome laser printer [1] to an exposure unit [36]; a photosensitive tray [25] that allows said color separation mask original plates [22] to adhere to photosensitive pressure-sensitive paper [24]; a storage part [27] that stores a developer sheet [26] that has applied to it a developer /41 that emits colors by reacting with the three primary colors, [21R], [21G], and [21B], for exposure and with a dye precursor contained in microcapsules applied on the surface of said photosensitive pressure-sensitive paper [24]; a pressure developing means [28] that develops an image onto said developer sheet [26] by overlapping said developer sheet [26] and said photosensitive pressure-sensitive paper [24] and by crushing unhardened microcapsules with pressure; a pressure developing means [28] that develops an image on said developer sheet [26]; a heat fixing device [29] that promotes color emission; a color-image discharge tray [30]; a manual tray [31] that allows said color separation mask original plates [22] to be inserted from the exterior; a color separation mask original plate discharge tray [32] that discharges said color separation mask original plates [22] after they have been exposed; a manual tray [33] used for said developer sheet [26]; and an image processing part [39], shown in Figure 1, that subjects the multi-value input density digital information of each resolution color to a color correction process, a binarizing process, etc. Moreover, each member of the optical system, the

photosensitive pressure-sensitive paper [24], the developer sheet, etc. of the present device correspond to the color transfer system.

Moreover, said image processing part [39] is comprised of the following: an interface [40] for the host that inputs multi-value input density digital information for each resolution color; a RAM (random-access memory) [41] that stores each element of the matrix for color correction, post-binarization-process image information, etc.; a ROM (read-only memory) [42] that stores a program and the data of multiple color samples that is for obtaining each element of the matrix for color correction; a CPU (central processing unit) that performs the calculations for the color correction process and binarization process; and an interface [44] for the laser printer that sends post-binarization-process image information to said monochrome laser printer [1] for each resolution color. Said ROM [42] has stored in it as said color sample data a total of 64 data groups of recording color information, [Co_1, Mo_1, Yo_1], [Co_2, Mo_2, Yo_2] … [Co_{64}, Mo_{64}, Yo_{64}] (also generically referred to as [Co, Mo, Yo]) that are obtained when the input density digital information, [Ci_1, Mi_1, Yi_1], [Ci_2, Mi_2, Yi_2] … [Ci_{64}, Mi_{64}, Yi_{64}] (also generically referred to as [Ci, Mi, Yi]) and their input colors [Ci, Mi, Yi] are input to the present color image recording device. Next, the operation of the color image recording device of the present working example will be explained in accordance with the flow chart indicated in Figure 3(a) and Figure 3(b).

First, information sent from the host side, such as a host computer, is loaded at said interface [40] for the host in Step [S1]. In Step [S2], it is determined in said CPU [43] whether or not said loaded information

is color-mode information, and if it is not color-mode information, said loaded information is sent as it is to said monochrome laser printer [1] by using said interface [4] for the laser printer in Step [S3]. If said loaded information is color-mode information, whether or not the mode of said loaded information is color setting modification is determined in said CPU [43].

If the mode of said loaded information is the color setting modification mode, the recording color information and input density digital information of multiple pieces of color sample data are loaded from said ROM [42] to said CPU [43] in Step [S5].

Next, the step advances to Step [S6], and the color sample data loaded in said Step [S5] becomes weighted. Concretely speaking, groups of recording color information and desired input color digital information of the color sample data become copied. In other words, n=65 or more data groups, [Cin, Min, Yin] and [Con, Mon, Yon] (wherein n is a natural number between 1 and N≥65), made up of said 64 data groups, [Ci, Mi, Yi] and [Co, Mo, Yo], and the copied group(s) are generated. The weighted values are determined by the number of these copies. For ~~the data to be weighted,~~ a flesh color that is visually sensitive or a color that has the highest histogram in the recording image is selected automatically or by means of a keyboard, not shown in the drawings. Next, the step advances to [S7], and a coefficient matrix, A\, is obtained based on the following logic by ~~using said~~ data group that was weighted in Step [S6].

First, the coefficient matrix, A\, is assumed to be as follows:

$$A = \begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix}$$

Next, the following equation is assumed with respect to said 64 or more groups, [Cin, Min, Yin] and [Con, Mon, Yon], selected in Step [S6]. /41

$$\begin{pmatrix} C_{in} \\ M_{in} \\ Y_{in} \end{pmatrix} = \begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix} \begin{pmatrix} C_{on} \\ M_{on} \\ Y_{on} \end{pmatrix}$$

If a coefficient matrix, A, that satisfies this equation for all ns exists, complete color correction, which is to output desired recording colors, becomes possible. However, an A that satisfies this equation generally does not exist. Therefore, A will be obtained approximately by using the least-squares method. First, the above equation will be rewritten so that it matches the actual situation.

$$\begin{pmatrix} C_{in} \\ M_{in} \\ Y_{in} \end{pmatrix} \simeq \begin{pmatrix} C_{in}' \\ M_{in}' \\ Y_{in}' \end{pmatrix} = \begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix} \begin{pmatrix} C_{on} \\ M_{on} \\ Y_{on} \end{pmatrix}$$

Next, the nth error that is used for the least-squares method will be defined as follows:

$$En = [(Cin - Cin')^2 + (Min - Min')^2 + (Yin - Yin')^2]^{1/2}$$

Then, an $\mathbb{A}$ that minimizes the total sum of squares, $\sum_{n=1}^{N} En^2$, of the En should be calculated.

For this, the following simultaneous equations will be generated in this step.

$$\frac{\partial}{\partial a_{11}} \sum_{n=1}^{N} En^2 = 0$$

$$\vdots$$

$$\frac{\partial}{\partial a_{33}} \sum_{n=1}^{N} En^2 = 0$$

Each element of the coefficient matrix, $\mathbb{A}$, is obtained by solving these simultaneous equations with respect to a_{11} through a_{33}.

This completes the adjusting that allows the colors desired by the user to be reproduced with extra accuracy, and the step returns to said Step [S1].

If the mode of said loaded information is not the color setting modification mode in said Step [S4], the input density digital information of the resolution colors of 1 pixel is loaded from said interface [40] for the host to said CPU [43] in Step [S9] of Fig. 3(b). Then, each element of said matrix for color correction stored in said RAM [41] is loaded into said CPU [43] in Step [S10]. Then, based on said input density digital information and said matrix for color correction, multi-value color correction density digital information of the recording resolution colors

are obtained in said CPU [43] in Step [S1] based on the following equation:

$$\begin{pmatrix} C' \\ M' \\ Y' \end{pmatrix} = \begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix} \begin{pmatrix} C \\ M \\ Y \end{pmatrix}$$

wherein C, M, and Y are the input density digital information of the resolution colors,

C′, M′, and Y′ are the color-correction density digital information of the recording resolution colors,

and a_{ij} is an element of the color correction matrix.

Next, the dither threshold that corresponds to the input pixel location of said input density digital information will be loaded from said ROM [42] to said CPU [43] in Step [S12]. Then, in Step [S13], it is determined in said CPU [43] whether or not the information of 1 recording resolution color in said color correction density dither information is larger than said dither threshold. If it is larger, the recording dots of said recording resolution color are turned off in Step [S14a], and if it is not larger, they are turned on in Step [S14b]. Then, by determining whether or not this has been performed for all recording resolution colors in said CPU [43] in Step [S15], said Step [S12] through Step [S14] are performed for all recording resolution colors.

Then, when it has been performed for all the resolution colors, the on/off information of the recording dots of 1 recording resolution color is sent from said interface [44] for the laser printer to said monochrome laser printer [1] in Step [S16] of Fig. 3(c). Then, in Step [S17], the

on/off information of the recording dots of recording resolution colors other than said 1 recording resolution color that was sent in said Step [S16] becomes stored in said RAM [41]. Then, whether or not this has been performed for all pixels of the color image is determined in said CPU [43] in Step [S18]. If not, the step returns to said Step [S9], and said Step [S9] through Step [S17] are carried out for all pixels of the color image.

After this has been carried out for all pixels of the color image, it is determined in Step [S19] whether or not the color resolution mask original plate of the previous recording resolution color /41 was output from said monochrome laser printer, and its arrival is awaited. After it arrives, the recording-dot on/off information of 1 remaining recording color stored in said RAM [41] is sent to said monochrome laser printer [1] by using said interface [44] for the laser printer. By allowing the CPU [43] to determine whether or not this has been performed for all the recording-dot on/off information of the recording colors stored in said RAM [41] in Step [S21], said Step [S22] and Step [S23] are made to be performed on all of said recording colors stored in said RAM [41].

Moreover, based on the recording-dot on/off information of said 1 recording resolution color that was sent to said monochrome laser printer [1], said polygon scanner [2] draws an electrostatic latent image on said charged photoconductor [3] by irradiating light. Said photoconductor [3] having the electrostatic latent image formed on it is developed by means of said developer [4], and a toner image is transferred onto regular paper or an OHP sheet supplied from said feeding cassette [5] and is fixed by

said fixing device [6].

The output from said monochrome laser printer [1] is sent to said monochrome discharge tray, [11] or [12], by means of said paper path switching part [10] if the mode is not color. If the mode is color, outputs are made for all of said recording resolution colors that arrive and are sequentially sent to said colorizing device [20]. (The output papers in the order of the output are referred to as color resolution mask original plates [22R], [22G], and [22B].)

Said color resolution mask original plate [22R] prepared by said monochrome laser printer [1] goes through said paper switching part [10], and the front end position of the color resolution mask original plate is determined by means of a roller [34] that is for determining the front end positions of color resolution mask original plates. By means of an electricity generating device [38], such as a corotron, said color resolution mask original plate [22R] is electrostatically attached to an insulated color resolution mask original plate transfer means [35] (e.g. PET), which is provided in the surrounding area in order to transfer color resolution mask original plates, and becomes transferred to the exposure unit [36]. By moving said color resolution mask original plate transfer means [35], said color resolution mask original plate [22R] is positioned in a manner such that color shifting does not occur in the color latent image formed on said photosensitive pressure-sensitive paper [24]. In said exposure unit [36], said color resolution mask original plate [22R] and said photosensitive pressure-sensitive paper [24] become attached by means of said exposure tray [25] and become exposed by means

of red light from said optical source [21R] for a certain amount of time. Thus, a latent image made up of unhardened cyan microcapsules for each of the pixels corresponding to said color resolution mask original plate [22R] is formed.

After the exposure, said color resolution mask original plate [22R] is discharged to said color resolution mask original plate discharge tray [32].

Then, the same will be performed on said color resolution mask original plates, [22G] and [22B], and a color latent image is thus formed on said photosensitive pressure-sensitive paper [24].

Said exposed photosensitive pressure-sensitive paper [24] is layered with said developer sheet [26] and becomes developed by means of said pressure developing means [28]. Said developer sheet then goes through said heat fixing device [29] and becomes discharged to said color image discharge tray [30]. After being subjected to pressure-developing, said used photosensitive pressure-sensitive paper [24] becomes wound by means of a winding means [37].

The present invention is not confined to the above-described working example, and various modifications can be made without departing from its principles.

For example, said image processing part [39] is built in said colorizing device [20] in the present working example, but it may be a device that is independent and separate from said colorizing device [20] or it may be inside said monochrome laser printer [1].

[Effects of the Invention]

As is clear from the above explanation, the present invention allows sufficient color corrections to be performed on at least the prescribed colors. Therefore, compared to conventional types, visually superior color corrections can be carried out with approximately the same number of calculations.

Therefore, the use of the present invention makes it possible to form, transfer, etc. images that are visually superior in short processing times.

4. Brief Explanation of the Drawings

The drawings show a working example that is an embodiment of the present invention. Figure 1 is a schematic block diagram of the image processing part of the color image recording device to which the present working example is applied. Figure 2 is a schematic cross-sectional drawing of the color image recording device, and Figure 3 (a) through (c) are flow charts indicating the process contents of the image processing part. /41

In the figures, [42] is a ROM that corresponds to the storage means, [S6] and [S7] are process steps that correspond to the coefficient matrix determining means, and [S11] is a process step that corresponds to the arithmetic means.

Figure 1

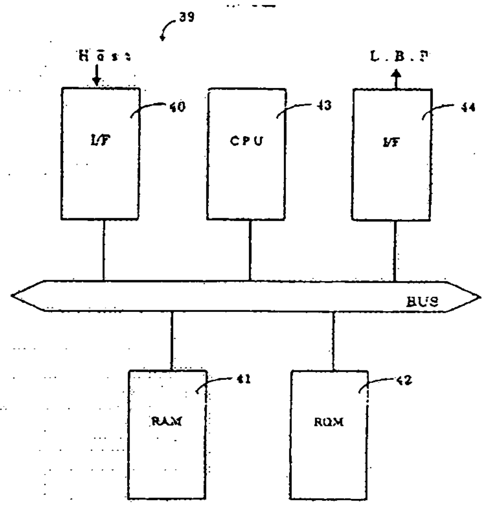


Figure 2

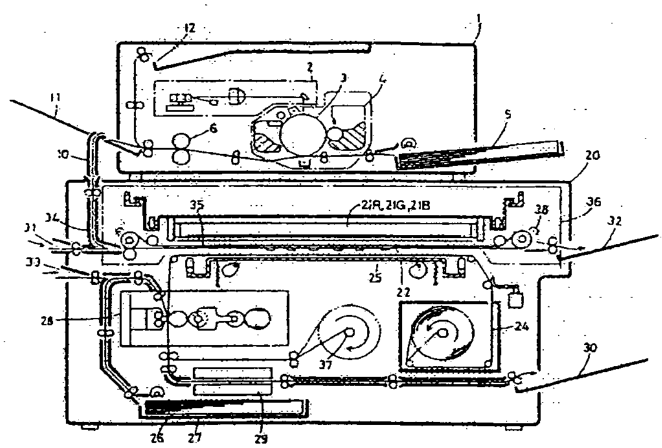
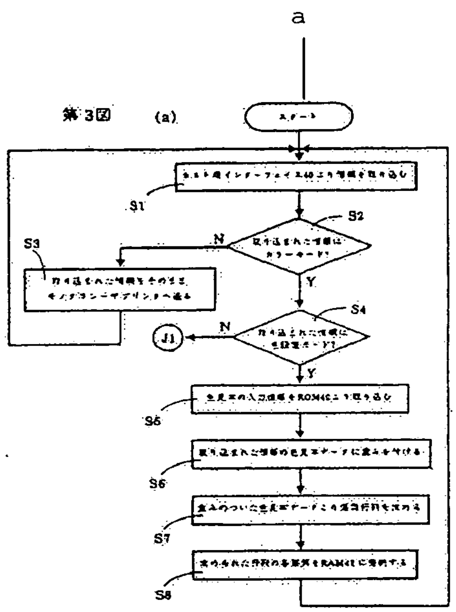


Figure 3(a) /41



Key: a) Start; S1) Information is loaded from the interface [40] for the host.; S2) Is the mode of the loaded information color?; S3) The loaded information is sent as it is to the monochrome laser printer.; S4) Is the mode of the loaded information color setting?; S5) The input information of the color sample is loaded from the ROM [42].; S6) The color sample data of the loaded information is weighted.; S7) A coefficient matrix is obtained based on the weighted color sample data.; S8) Each element of the obtained matrix is stored in the RAM [41].

Figure 3(b)

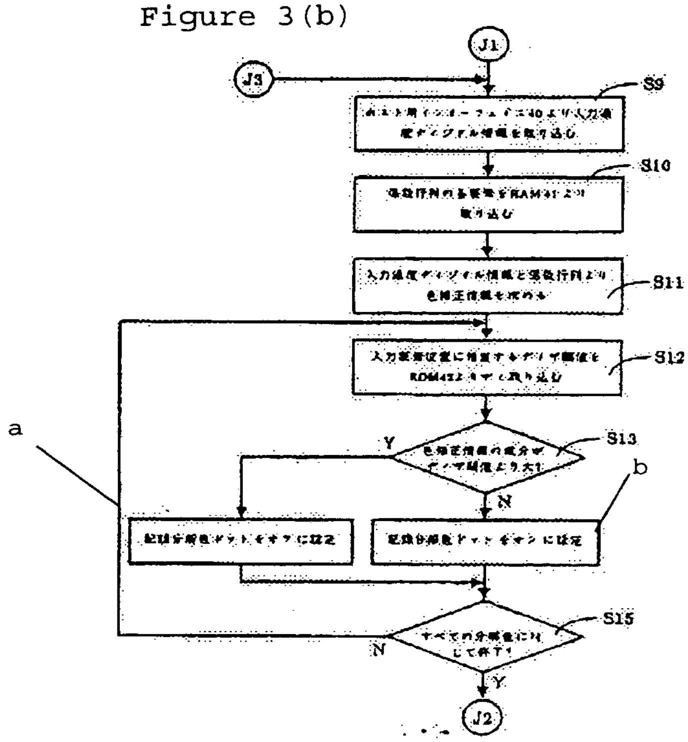
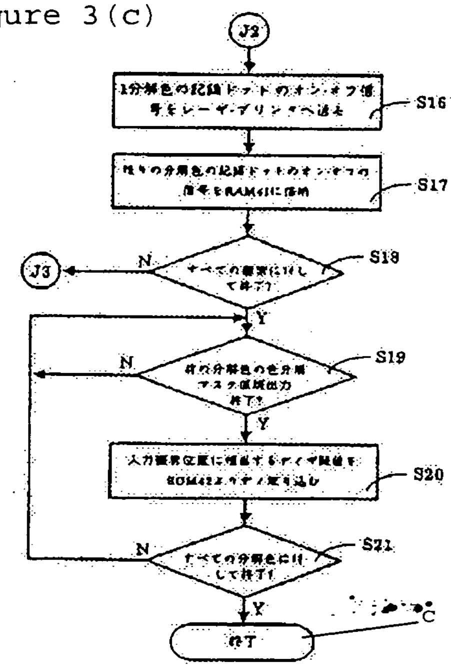


Figure 3(c)



Key: S9) Input density digital information is loaded from the interface [40] for the host.; S10) Each element of the coefficient matrix is loaded from the RAM [41].; S11) Color correction information is obtained based on the input density digital information and coefficient matrix.; S12) The dither threshold that corresponds to the input pixel position is loaded from the ROM [42].; S13) Is the component of the color correction information larger than the dither threshold?; a) The dot of the recording resolution color is set to off.; b) the dot of the recording resolution color is set to on.; S15) Completed for all the resolution colors?; S16) The on/off signal for the recording dot of 1 resolution color is sent to the laser printer.; S17) The on/off signals for the recording dots of the remaining resolution colors are stored in the RAM [41].; S18) Completed for all pixels?; S19) Has the color resolution mask original plate of the previous resolution color been output?; S20) The dither threshold that corresponds to the input pixel position is loaded from the ROM [42].; S21) Completed for all the resolution colors?; c) End.

APPENDIX C

No related proceedings are referenced in II. above, hence copies of decisions in related proceedings are not provided.

Effective on 12/08/2004.
Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).

FEE TRANSMITTAL
For FY 2006

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 500.00

Complete if Known	
Application Number	09/209,982-Conf. #6236
Filing Date	December 9, 1998
First Named Inventor	Michael Kaplinsky
Examiner Name	J. M. Villecco
Art Unit	2622
Attorney Docket No.	M4065.0858/P858

METHOD OF PAYMENT (check all that apply)

☐ Check ☒ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): ______

☒ Deposit Account Deposit Account Number: 04-1073 Deposit Account Name: Dickstein Shapiro LLP

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☒ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, **except for the filing fee**

☒ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17 ☒ Credit any overpayments

FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

Application Type	FILING FEES Fee ($)	FILING FEES Small Entity Fee ($)	SEARCH FEES Fee ($)	SEARCH FEES Small Entity Fee ($)	EXAMINATION FEES Fee ($)	EXAMINATION FEES Small Entity Fee ($)	Fees Paid ($)
Utility	300	150	500	250	200	100	
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	Fee ($)	Small Entity Fee ($)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple dependent claims	360	180

Total Claims		Extra Claims		Fee ($)		Fee Paid ($)
14	- 20 =		x		=	

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims		Extra Claims		Fee ($)		Fee Paid ($)
3	- 3 =		x		=	

HP = highest number of independent claims paid for, if greater than 3.

Multiple Dependent Claims	
Fee ($)	Fee Paid ($)

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets		Extra Sheets		Number of each additional 50 or fraction thereof		Fee ($)		Fee Paid ($)
	- 100 =		/50		(round **up** to a whole number) x		=	

4. OTHER FEE(S) **Fees Paid ($)**

Non-English Specification, $130 fee (no small entity discount)

Other (e.g., late filing surcharge): 1402 Filing a brief in support of an appeal 500.00

SUBMITTED BY					
Signature	[signature]	Registration No. (Attorney/Agent)	28,371	Telephone	(202) 420-2232
Name (Print/Type)	Thomas J. D'Amico			Date	December 18, 2006

IFW
AF$
CC

PTO/SB/21 (09-06)
Approved for use through 03/31/2007. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	09/209,982-Conf. #6236
Filing Date	December 9, 1998
First Named Inventor	Michael Kaplinsky
Art Unit	2622
Examiner Name	J. M. Villecco
Attorney Docket Number	M4065.0858/P858
Total Number of Pages in This Submission	

ENCLOSURES (*Check all that apply*)

- [x] Fee Transmittal Form
  - [ ] Fee Attached
- [ ] Amendment/Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
- [ ] Express Abandonment Request
- [ ] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [ ] Reply to Missing Parts/ Incomplete Application
  - [ ] Reply to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert to a Provisional Application
- [x] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
- [ ] Request for Refund
- [ ] CD, Number of CD(s) ______
  - [ ] Landscape Table on CD
- [ ] After Allowance Communication to TC
- [ ] Appeal Communication to Board of Appeals and Interferences
- [x] Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- [ ] Proprietary Information
- [ ] Status Letter
- [ ] Other Enclosure(s) (please identify below):

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	DICKSTEIN SHAPIRO LLP		
Signature			
Printed name	Thomas J. D'Amico		
Date	December 18, 2006	Reg. No.	28,371

Docket No.: M4065.0858/P858
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Michael Kaplinsky

Application No.: 09/209,982

Confirmation No.: 6236

Filed: December 9, 1998

Art Unit: 2622

For: COLOR CORRECTION OF MULTIPLE COLORS USING A CALIBRATED TECHNIQUE

Examiner: J.M. Villecco

PAPER UNDER 37 C.F.R. § 1.32(C)(3)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

The Power of Attorney filed herewith lists more than ten patent practitioners. Pursuant to 37 C.F.R. § 1.32(c)(3), Applicant requests that only the practitioners that are associated with Customer Number 45374 be recognized by the Office as being of record in the present application.

Dated: December 18, 2006

Respectfully submitted,

By ____________________

Thomas J. D'Amico
Registration No.: 28,371
Jennifer M. McCue
Registration No.: 55,440
DICKSTEIN SHAPIRO LLP
1825 Eye Street NW
Washington, DC 20006-5403
(202) 420-2200
Attorneys for Applicant

Docket No.: M4065.0858/P858
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Michael Kaplinsky

Application No.: 09/209,982

Group Art Unit: 2851

Filed: December 9, 1998

Examiner: Not Yet Assigned

For: COLOR CORRECTION OF MULTIPLE COLORS USING A CALIBRATED TECHNIQUE

REVOCATION OF POWER OF ATTORNEY AND NEW POWER OF ATTORNEY

Commissioner for Patents
Washington, DC 20231

Dear Sir:

The undersigned, a duly authorized representative of Micron Technology, Inc. and current assignee of this application as demonstrated by the attached copy of the assignment, hereby revokes all Powers of Attorney previously given, and hereby appoints the following attorneys and/or agents to prosecute this application and transact all business in the U.S. Patent and Trademark Office connected herewith:

Gary M. Hoffman	26,411	Ryan H. Flax	48,141	Ellen S. Tao	43,383
Thomas J. D'Amico	28,371	Richard LaCava	41,135	Gary L. Veron	39,057
Donald A. Gregory	28,954	John C. Luce	34,378	Steven I. Weisburd	27,409
James W. Brady, Jr.	32,115	Peter McGee	35,947	Peter Zura	48,196
Jon D. Grossman	32,699	Edward A. Meilman	24,735	Jeremy A. Cubert	40,399
Mark J. Thronson	33,082			Gianni Minutoli	41,198
Eric Oliver	35,307	William E. Powell, III	39,803	Michael Bergman	42,318
Laurence E. Fisher	37,131	Steven S. Rubin	43,063	Salvatore P. Tamburo	45,153
Ian R. Blum	42,336	Michael J. Scheer	34,425	Peter A. Veytsman	45,920

Gabriela I. Coman	50,515	Stephen A. Soffen	31,063	Christopher S. Chow	46,493
Catherine A. Ferguson	40,877	Christopher M. Tanner	41,518		

All attorneys of the law firm Dickstein Shapiro Morin & Oshinsky LLP and also, listed as follows:

Charles B. Brantley, III	38,086	Kevin D. Martin	37,882	Russell Slifer	39,838
Michael L. Lynch	30,871	David J. Paul	34,692		

attorneys/agents of Micron Technology, Inc. as its attorneys with full power of substitution to prosecute this application and to transact all business in the Patent and Trademark Office in connection therewith.

Address all communications to:

Thomas J. D'Amico
DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP
2101 L Street NW
Washington, DC 20037-1526
(202) 785-9700

For: Micron Technology, Inc.

Michael L. Lynch

Dated: 1-22-03

ASSIGNMENT OF PATENTS

This ASSIGNMENT OF PATENTS (this "Assignment of Patents"), dated as of November 21, 2001, is entered into by and among Micron Technology, Inc., a Delaware corporation ("Buyer"), Photobit Corporation, a Delaware corporation ("Parent"; Parent is sometimes referred to herein as a "Seller") and Photobit Technology Corporation, a Delaware corporation and a wholly owned subsidiary of Seller ("Subsidiary"; Parent and Subsidiary are sometimes referred to herein as a "Seller" and sometimes collectively as the "Sellers").

This Assignment of Patents is entered into pursuant to Section 6.23 of the Asset Purchase Agreement dated as of November 21, 2001, (the "Asset Purchase Agreement;" capitalized terms used herein but not otherwise defined herein shall have the same meanings assigned to them in the Asset Purchase Agreement), by and among Parent, Subsidiary, Buyer, Dr. Sabrina Kemeny, Dr. Eric Fossum, Robert Panicacci and the Seller Representative.

Pursuant to the Asset Purchase Agreement, Sellers agreed, among other things, to transfer to Buyer all of Sellers' right, title and interest in and to the Acquired Assets, in exchange for the payment by Buyer of the Purchase Price and the assumption by Buyer of the Assumed Liabilities, in each case on the terms and subject to the conditions provided in the Asset Purchase Agreement.

1. Assignment of Patents by Sellers. Sellers hereby irrevocably and formally grant, bargain, sell, transfer, convey, assign and deliver to Buyer all right, title and interest in and to the patents, patent applications and provisional applications owned by each Seller throughout the world, together with any and all rights of such Seller associated with inventions claimed therein and/or with the applications and patents, whether or not such patents are registered with the United States Patent and Trademark Office or other comparable governmental authority of any foreign jurisdiction (including, without limitation, those patents and applications set forth on Exhibit A hereto) (the "Assigned Patents"), free and clear of all encumbrances, together with all causes of action and other rights to sue for and remedies against past, present and future infringements of any of the foregoing, together with the right to collect damages therefore, and rights of priority and protection of interests therein under the laws of any jurisdiction worldwide and all tangible embodiments thereof, to have and to hold the same unto Buyer, its successors and assigns, for and during the existence of such rights and all renewals thereof.

2. Further Assurances. Each Seller hereby covenants and agrees that from time to time and at the expense of such Seller and without further consideration, upon request of Buyer, each Seller shall and shall cause each of its affiliates to execute and deliver such instruments and documents, and take such further actions, as Buyer reasonably may request in order to sell, convey, transfer and assign to Buyer, or to record Buyer's interest in or title to, any of the Assigned Patents.

3. Power of Attorney. Each Seller hereby constitutes and appoints Buyer as such Seller's true and lawful attorney in fact, with full power of substitution in such Seller's name and

stead, to take any and all steps, including proceedings at law, in equity or otherwise, to execute, acknowledge and deliver any and all instruments and assurances necessary or expedient in order to vest or perfect the aforesaid rights and causes of action more effectively in Buyer or to protect the same or to enforce any claim or right of any kind with respect thereto. Each Seller hereby declares that the foregoing power is coupled with an interest and as such is irrevocable.

4. Successors and Assigns. This Assignment of Patents shall be enforceable against the successors and assigns of Sellers and shall inure to the benefit of the successors and assigns of Buyer.

5. Governing Law. This Assignment of Patents shall be governed by and construed in accordance with the laws of the United States, in respect to patent issues and in all other respects, including as to validity, interpretation and effect, by the internal laws of the State of California, without giving effect to the conflict of laws rules thereof.

IN WITNESS WHEREOF, this Assignment of Patents has been duly executed and delivered as of the date first written above.

MICRON TECHNOLOGY, INC.

By: ____________________

Printed Name: W.G. STOVER, JR.

Title: VICE PRESIDENT OF FINANCE AND C.F.O

PHOTOBIT CORPORATION

By: ____________________

Printed Name: ____________________

Title: ____________________

PHOTOBIT TECHNOLOGY CORPORATION

By: ____________________

Printed Name: ____________________

Title: ____________________

IN WITNESS WHEREOF, this Assignment of Patents has been duly executed and delivered as of the date first written above.

MICRON TECHNOLOGY, INC.

By:______________________________

Printed Name:______________________________

Title: ______________________________

PHOTOBIT CORPORATION

By: [signature]

Printed Name: SABRINA KEMENY

Title: CEO

PHOTOBIT TECHNOLOGY CORPORATION

By: [signature]

Printed Name: SABRINA KEMENY

Title: EXECUTIVE V. P.

ACKNOWLEDGMENT – PHOTOBIT CORPORATION

STATE OF CALIFORNIA)
) SS:
COUNTY OF SAN FRANCISCO)

I, Teresa Solis, a Notary Public in and for said County, in the State aforesaid, DO HEREBY CERTIFY that Sabrina Kemeny, appeared before me this day in person, and acknowledged that she executed and delivered the Instrument of Assignment of Patents above as her free and voluntary act and in her representative capacity for Photobit Corporation, a Delaware corporation, acting in its representative capacity as the Chairman and CEO of Photobit Corporation., a Delaware corporation, for the uses and purposes herein set forth.

IN WITNESS WHEREOF, I have hereunto my hand and notarial seal this 21st day of November 2001.

TERESA SOLIS
COMM. # 1237290
NOTARY PUBLIC-CALIFORNIA
City & County of San Francisco
COMM. EXP. OCT. 22, 2003
MGC1 MGC1

Teresa Solis
Notary Public

My Commission Expires: October 22, 2003

ACKNOWLEDGMENT- PHOTOBIT TECHNOLOGY CORPORATION

STATE OF CALIFORNIA)
) SS:
COUNTY OF SAN FRANCISCO)

I, Teresa Solis, a Notary Public in and for said County, in the State aforesaid, DO HEREBY CERTIFY that Sabrina Kemeny, appeared before me this day in person, and acknowledged that she executed and delivered the Instrument of Assignment of Patents above as her free and voluntary act and in her representative capacity for Photobit Technology Corporation, a Delaware corporation, acting in their representative capacity as the Chairman and CEO of Photobit Technology Corporation, a Delaware corporation, for the uses and purposes herein set forth.

IN WITNESS WHEREOF, I have hereunto my hand and notarial seal this 21st day of November 2001.

TERESA SOLIS
COMM. # 1237290
NOTARY PUBLIC-CALIFORNIA
City & County of San Francisco
COMM. EXP. OCT. 22, 2003
MGC1 MGC1

Teresa Solis
Notary Public

My Commission Expires: October 22, 2003

EXHIBIT A

Photobit Patents Issued and Pending Applications.

	Photobit Patent or Provisional Application Title	Description/Comments	PB NTR #
	PATENTS ISSUED		
1	Median Filter With Embedded Analog to Digital Converter	Patent #5,995,163	9601
2	Low-Voltage Common Source Switched-Capacitor Amplifier	Patent #6,049,247	9702
3	Quantum Efficiency Improvements in Active Pixel Sensors	Patent #6,005,619	9704
4	Bidirectional Follower for Driving a Capacitive Load	Patent #6,043,690	9719
5	Analog-to-Digital Conversion	Patent #6,087,970	9603
6	Low-Voltage Comparator with Wide Input Voltage Swing	Patent #6,147,519	9703
7	Programmable Analog Arithmetic Circuit for Imaging Sensor	Patent #6,166,367	9706
8	Correction of Missing Codes Nonlinearity in A to D Converters	Patent #6,255,970	9708
9	Charge-Domain Analog Readout for an Image Sensor	Patent #6,222,175	9712
10	A/D Converter Correction Scheme	Patent #6,191,714	9713
11	Active Pixel Sensor With Current Mode Readout	Patent #6,194,696	9714
12	Differential Non-Linearity Correction Scheme	Patent #6,215,428	9716
13	CMOS Image Sensor with Different Pixel Sizes for Different Colors	Patent #6,137,100	9718
14	Pulse-Controlled Light Emitting Diode Source	Patent #6,222,172	9801
15	CMOS Voltage Comparator Capable of Operating With Small Input Voltage Difference	Patent #6,184,721	9809
16	Using Single Lookup Table To Correct Differential Non-Linearity Errors In An Array Of A/D Converters	Patent #6,211,804	9813
17	Concentric Lens with Aspheric Correction	Patent #6,097,545	9816
18	Using Cascaded Gain Stages for High-Gain and High-Speed Readout of Pixel Sensor Data	Patent #6,229,134	9817
19	Lock-In Pinned Photodiode Photo-detector	Patent #6,239,456	9822
20	Ping-Pong Readout	Patent #6,204,792	9828
21	Nonlinear Flash Analog To Digital Converter Used In Active Pixel System	Patent #6,295,013	9818 9819
	PHOTOBIT/GENTEX JOINTLY OWNED IP		
1	Wide Dynamic Range Optical Sensor	Patent #6,008,486	
2	Vehicle Vision System	Patent Application Serial No. 09/001,855	
	PATENT APPLICATIONS		
1	Dead Pixel Correction by Row/Column Substitution	Patent Application Serial No. 09/031,145	9602
2	Color Interpolation	Patent Application Serial No. 09/028,961	9604
3	Double Comparison Successive Approximation Method and Apparatus	Patent Application Serial No. 09/360,294	9701
4	Digital Exposure Circuit For An Image Sensor	Patent Application Serial No. 09/298,306	9705
5	Method and Circuit for Fast and Accurate Adjustment of Integration Time for CMOS APS Cameras	Patent Application Serial No. 09/281,765	9707
6	Smart Column Controls for High Speed Multi-Resolution Sensors	Patent Application Serial No. 09/251,758	9709
7	Increasing Readout Speed in CMOS APS Sensors through Block Readout	Patent Application Serial No. 09/274,739	9710
8	Active Pixel Color Linear Sensor With Line-Packed Pixel Readout	Patent Application Serial No. 09/252,428	9711
9	Three Sided Buttable CMOS Image Chip	Patent Application Serial No. 09/211,718	9715

	Photobit Patent or Provisional Application Title	Description/Comments	PB NTR #
10	Photodiode-Type Pixel For Global Electronic Shutter And Reduced Lag	Patent Application Serial No. 09/025,079	9717
11	Wide Dynamic Range Fusion Using External Memory Look-Up	Patent Application Serial No. 09/299,066	9720
12	Active Pixel Sensor With Mixed Analog and Digital Signal Integration	Patent Application Serial No. 09/183,389	9721
13	Look Ahead Shutter Pointer Allowing Real Time Exposure Control	Patent Application Serial No. 09/038,888	9802
14	Readout Circuit With Gain and Analog-to-Digital Conversion For Image Sensor	Patent Application Serial No. 09/264,501	9803
15	Using A Single Control Line To Provide Select And Reset Signals In Two Rows Of A Digital Imaging Device	Patent Application Serial No. 09/250,623	9804
16	High Resolution CMOS Circuit Using a Matched Impedance Output Transmission Line	Patent Application Serial No. 09/359,056	9806
17	Reducing Internal Bus Speed in a Bus System Without Reducing Readout Rate	Patent Application Serial No. 09/359,068	9807
18	RAM Line Storage for Fixed Pattern Noise Correction	Patent Application Serial No. 09/066,508	9808
19	Latched Row Logic for a Rolling Exposure Snap	Patent Application Serial No. 09/261,361	9810 9812
20	Analog To Digital Converter with Internal Data Storage	Patent Application Serial No. 09/281,358	9811
21	Low Light Sensor Signal to Noise Improvement	Patent Application Serial No. 09/359,065	9814
22	Nonlinear Flash Analog to Digital Converter Used in Active Pixel System	Patent Application Serial No. 09/161,355	9818 9819
23	Oversampled Centroid A to D Converter	Patent Application Serial No. 09/430,625	9820
24	Over Sampled CMOS Image Sensor	Patent Application Serial No. 09/429,776	9821
25	Pinned Floating Photoreceptor With Active Pixel Sensor	Patent Application Serial No. 09/397,381	9823
26	Oversampled CMOS Image Sensor	Patent Application Serial No. 09/430,734	9824
27	Optical Range Finder	Patent Application Serial No. 09/429,882	9825
28	Color Correction of Multiple Colors Using A Calibrated Technique	Patent Application Serial No. 09/209,982	9826
29	Micro Power Micro-Sized CMOS Active Pixel	Patent Application Serial No. 09/418,961	9827
30	ALow Power Signal Chain for Image Sensors CMOS APS	Patent Application Serial No. 09/590,785	9829
31	Matched Color CMOS Sensor	Patent Application Serial No. 09/267,503	9831
32	Clear Plastic Packaging in a CMOS Active Pixel Image	Patent Application Serial No. 09/442,871	9832
33.	Semiconductor Imaging Sensor Array Devices With Dual-Port Digital Readout for CMOS Image Sensor	Patent Application Serial No. 09/449,194	9833
34	High-Speed Sampling Of Signals In Active Pixel Sensors	Patent Application Serial No. 09/527,422	9834
35	Multi-Chip Addressing For The I²C Bus	Patent Application Serial No. 09/459,720	9835
36	Circuits larger than the max. Reticle size in deep sub micron process	Patent Application Serial No. 09/523,127	9836
37	Compensation for Optical Distortion at Imaging Plane	Patent Application Serial No. 09/354,930	9837

	Photobit Patent or Provisional Application Title	Description/Comments	PB NTR #
38	Contoured Surface of Image Plane Array Cover Plate	Patent Application Serial No. 09/470,284	9839
39	Backside Illumination of CMOS Image Sensor	Patent Application Serial No. 09/483,362	9901
40	A Technique For Flagging Oversaturated Pixels	Patent Application Serial No. 09/505,645	9902
41	Diagonalized Image Sensor Pixels For Improved Effective Performance	Patent Application Serial No. 09/507,565	9903
42	Active Pixel Sensor With Fully-Depleted Buried Photoreceptor	Patent Application Serial No. 09/516,433	9904
43	An Analog Solution for Oversaturated Pixel Problem	Patent Application Serial No. 09/522,287	9905
44	Superposed Multi-Junction Color APS	Patent Application Serial No. 09/522,286	9906
45	Multi Junction APS with Dual Simultaneous Integration	Patent Application Serial No. 09/519,930	9907
46	A Novel Idea for a New Readout Structure of APS	Patent Application Serial No. 09/595,592	9908 9909 9910
47	Increasing Pixel Conversion Gain in CMOS Image Sensors	Patent Application Serial No. 09/553,980	9912
48	Dual Sensitivity Image Sensor	Patent Application Serial No. 09/596,757	9915
49	Layout Technique For Semiconductor Processing Using Stitching	Patent Application Serial No. 09/687,266	9916 9917
50	Active Pixel Sensor with Reduced Fixed Pattern Noise	Patent Application Serial No. 09/550,816	9918
51	Low Voltage Analog-To-Digital Converters With Internal Reference Voltage and Offset	Patent Application Serial No. 09/538,043	9922
52	Techniques to Increase Signal Dynamic Range in CMOS APS	Patent Application Serial No. 09/653,527	9923
53	Low Power Analog-To-Digital Conversion	Patent Application Serial No. 09/528,310	9926
54	Calibration Circuit for Successive Approximation ADC.	Patent Application Serial No. 09/746,565	9927
55	P-Type Reset/Readout Circuitry for Radiation Hard APS	Patent Application Serial No. 09/648,403	9929
56	Novel Lenses Using Coherent Optical Fiber Bundles	Patent Application Serial No. 09/745,854	9931
57	Dynamic Histogram Equalifzation for High Dynamic Range Images	Patent Application Serial No. 09/778,151	9933
58	Compact Realization of 2-Reset Pointer Rolling Shutter in CMOS Sensor	Patent Application Serial No. 09/776,400	9935
59	Testing Of Solid-State Image Sensors	Patent Application Serial No. 09/692,742	9941
60	Adjustable Color-Plane-Pixel Integration Times for Asynchronous Pixel Saturation Avoidance	Patent Application Serial No. 09/761,868	9943
61	Improved Method for Flushed Reset	Patent Application Serial No. 09/858,748	9944
62	A New Frame-Shutter Pixel Structure with an Isolated Storage Node	Patent Application Serial No. 09/792,634	9945
63	Frame-Shuttering Scheme For Increased Frame Rate	Patent Application Serial No. 09/792,292	9946
64	Shared Photodetector Active Pixel	Patent Application Serial No. 09/681,639	9948
65	An Optimal Layout Technique for Row/Column Decoders to Reduce Number of Blocks	Patent Application Serial No. 09/860,031	9950
66	Microlenses With Spacking Elements To Increase An Effective Use of Substrate	Patent Application Serial No. 09/859,224	2004 2006
67	Pixel Optimization for Color	Patent Application Serial No. 09/922,507	2009

	Photobit Patent or Provisional Application Title	Description/Comments	PB NTR #
68	Image Sensing System With Histogram Modification	Patent Application Serial No. 09/761,218	2012
69	Image Sensor Having Boostted Reset	Patent Application Serial No. 09/917,195	2014 2015
70	A High-Speed Analog-To-Digital Converter Using Multiple Staggered Successive Approximation Cells	Provisional Patent Application Serial No. 60/243,324	2016
71	White Spot Reduction For CMOS Imaging	Provisional Patent Application Serial No. 60/243,328	2017
72	New Architecture For High-Speed ADC Using Multiple Successive Approximation Cells	Provisional Patent Application Serial No. 60/253,430	2019
73	CMOS Sensor With Dual Column Parallel Analog-To-Digital Converters	Provisional Patent Application Serial No. 60/313,117	2020
74	Reference Voltage Circuit For Differential Analog-To-digital Converter (ADC)	Provisional Patent Application Serial No. 60/247,401	2021
75	Pseudo Random Assignment To Remove FPN Of High-Speed ADC Using Multiple Successive Approximation Cells	Provisional Patent Application Serial No. 60/306,753	2022
76	Frame-Scale Package	Provisional Patent Application Serial No. 60/245,085	2024
77	Black-Level Compensation With On-Chip successive Approximation ADC	Provisional Patent Application Serial No. 60/244,412	2025
78	An Improved Frame Shutter For CMOS APS	Provisional Patent Application Serial No. 60/243,899	2026
79	Wide Dynamic Range Operation For CMOS Sensor With Freeze-Frame Shutter	Provisional Patent Application Serial No. 60/243,898	2027
80	Freeze-Frame Shutter Imager With Increased Dynamic Range	Provisional Patent Application Serial No. 60/242,215	2028
81	Power Optimization For Class A Amplifier With Variable Signal Gain By matching Of Unity Gain Bandwidth To the Demanded Gain	Provisional Patent Application Serial No. 60/285,431	2029
82	Dynamic Range Extension In Color CMOS Active Pixel Sensors	Provisional Patent Application Serial No. 60/259,352	2030
83	Reducing Power Consumption And Noise In CMOS APS Sensor Through Block Read-Out	Patent Application Serial No. 09/901,280	2031
84	Reducing KTC Noise In 3T and 5T CMOS APS	Provisional Patent Application Serial No. 60/281,603	2102
85	Reference Voltage Stabilization In CMOS Sensors	Patent Application Filed 10/12/01 Serial No. pending	2109
86	Low Power Differential Charge Mode Readout Circuit, Pipelined Gain Stage, And Pipelined ADC For CMOS Active Pixel Sensors	Provisional Patent Application Serial No. 60/280,589	2110
87	A New Row Driver Circuit For CMOS APS Using Shared Row-Reset Pixels And Charge Pump Boosting Circuit	Patent Application Serial No. 09/876,848	2111
88	Temperature Sensor Using The Image Read-Out Signal Chain Of An Active Pixel Image Sensor Having Double Sampling Of A Pixel Reset Voltage And A Pixel Image Voltage Level	Provisional Patent Application Serial No. 60/306,718	2112
89	Method For Optimizing Microlens/CFA/Pixel Cooperative Performance In Image Sensors	Provisional Patent Application Serial No. 60/286,908	2113
90	On-Chip ADC Test for Image Sensors	Provisional Patent Application Serial No. 60/313,122	2115
91	Variable Pixel Clock Electronic Shutter Control Algorithm For Corruption-Free Image Stream During Pixel Speed Changes	Provisional Patent Application Serial No. 60/306,744	2118
92	An Architecture For Increased Dynamic Range In CMOS APS	Provisional Patent Application	2119

	Photobit Patent or Provisional Application Title	Description/Comments	PB NTR #
		Serial No. 60/607,514	
93	Flexy-Power Amplifier: A New Amplifier With Built-In Power Management	Provisional Patent - Application Serial No. 60/307,513	2120